Prevalence and risk factors of smoking among healthcare workers and non-healthcare workers in Zambezi region, Namibia: A cross-sectional study

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Background. Smoking is a major risk factor for non-communicable diseases, and remains a significant public health challenge in many low- and middle-income countries, including Namibia.
Objective. To estimate the prevalence of smoking and its associated risk factors among healthcare workers (HCWs) and non-HCWs in Zambezi region, Namibia.
Methods. An exploratory cross-sectional survey was conducted between March and October 2020 among residents of the eight constituencies of Zambezi region. A total of 461 respondents who had been residents of the selected constituencies for over 5 years and were aged between 17 and 60 years were selected for the study. The main outcome measure was current cigarette smoking status. Descriptive statistics were used to summarise the sociodemographic characteristics of the respondents. We stratified data analysis according to whether individuals were health workers or non-health workers. A bivariate Pearson χ^2 test was used to determine the association between sociodemographic characteristics and smoking status. Statistically significant variables in the bivariate analysis were used as predictors in the univariate and multivariate models.
Results. The response rate of potential participants was 95% (*n*=434). The mean (standard deviation) age of participants was 32.5 (11.34) years. Significant relationships were observed between smoking status and area of residency (constituency), gender, age category, level of education, age of onset of smoking and daily smoking frequency. The majority of smokers (*n*=108) were non-HCWs, with males the majority (*n*=62). Age (*p*=0.001), education levels (*p*=0.001) and area of residency (*p*=0.022) were highly associated with smoking among non-HCWs, while marital status was associated with smoking among HCWs (*p*=0.013). In the final multivariate model, the odds of smoking among female non-HCWs were significantly lower (odds ration (OR) 0.386; 95% confidence interval (CI) 0.228 - 0.655). Furthermore, the odds of smoking among this same group were lower among those who had secondary-level education (OR 0.178; 95% CI 0.0659 - 0.483), post-secondary (OR 0.117; 95% CI 0.0412 - 0.330) and first-stage tertiary (OR 0.306; 95% CI 0.106 - 0.881) compared with those who had primary school education.
Conclusion. The smoking prevalence among non-HCWs and HCWs working in Zambezi included in the study was similar to that of the general Namibian population, but higher than that in neighbouring countries within the Southern African Development Community. The results showed a need for the establishment of specific smoking-related strategies that target HCWs to address smoking use parallel to the running strategies of non-HCWs, which would ultimately decrease smoking prevalence and improve health.

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Tobacco use is one of the leading risk factors for various short- and long-term respiratory diseases, cancer and heart disease,[1-3] and accounts for about 5 million tobacco use-related deaths annually.[4] Furthermore, according to the World Health Organization (WHO), over 80% of tobacco users globally are from low- and middle-income countries,[5] where both tobacco-related deaths and reduced productivity have been on the rise.[6,7] The global prevalence of smoking was observed to reduce between 1980 and 2012.[7] However, there are still over 1 billion adult tobacco smokers.[4] In addition, the prevalence of tobacco smoking appears to be increasing in the African region and the Eastern Mediterranean region,[8,9] increasing the risks of tobacco smoking-related mortality and morbidity.[4,5]

In 2000, the overall prevalence of smoking was projected to be about 20% in Namibia; this changed very slightly by 2015,

with an estimated moderate increase to 21% by 2025.[10] This rise in prevalence has been intensified by male smoking, which increased from 28% to 32% between 2000 and 2015, in comparison with female smoking during the same period, which reduced from 13% to 9%.[10] This suggests the need to develop strategies against tobacco use particularly among socioeconomically disadvantaged or less-educated communities in Namibia. Understanding the factors associated with smoking, among both HCWs responsible for health promotion and community members, is crucial in designing tobacco-use mitigation strategies. Although the causes of smoking are complex and multifaceted, understanding these factors from the perspective of a HCW in charge of strategy implementation, and those who are the beneficiaries of the control strategies, is essential.

Although various surveys have been conducted regarding smoking in Namibia,[11,12] studies on the prevalence of smoking and factors associated with it are still missing, thus increasing the difficulties associated with designing control interventions. Owing to the influence of local social and policy contexts in influencing tobacco use, understanding factors associated with tobacco use in a culturally dynamic country increases the success of designing an inclusive control programme.[13] Therefore, the current study sought to estimate the prevalence of smoking in Zambezi region, and to explore factors associated with smoking.

Methods

Study setting

Zambezi region, formally known as Caprivi region, is one of the 14 regions of Namibia. It is located in the north-eastern part of the country, bordering Kavango region on the west, as well as Botswana, Zimbabwe, Zambia and Angola. The region is divided into 8 administrative constituencies: Kabbe North; Kabbe South; Judea Lyamboloma; Linyanti; Sibbinda; Kongola; Katima Mulilo Urban; and Katima Mulilo Rural. The administrative capital of the region is Katima Mulilo. According to the Namibia Statistics Agency, the population size of Zambezi region in 2016 was 98 849, of whom 51% are female.[14] According to the Namibia National Planning Commission, 69% of the population in this region is rural.[15] Furthermore, the region is the third-poorest region in Namibia in terms of regional ranking, and the most severely affected areas are Kongola and Sibbinda constituencies, where ~58% and 55% of the population live below the poverty line, respectively.[15]

Study design, participants and sampling

An exploratory cross-sectional survey was conducted between March and October 2020 among residents of the eight[8] constituencies of Zambezi region. A total of 461 respondents who had been residents of the selected constituencies for over 5 years and were aged between 17 and 60 years were selected for the study. To determine the number of respondents from each area within the region, proportionate sampling using Namibian statistics data for the year 2016 was used. All potentially eligible respondents from the regions in the selected age groups were approached, introduced to the study and invited to participate. Only those who agreed and signed consent forms were enrolled in the study.

Study instrument and data collection

A structured interview and self-administered pretested questionnaire were designed in English and translated to the locally spoken language, Silozi, and administered to each respondent. Before being administered, the content of the questionnaire was explained to each participant. The study instrument collected data on the demographic and socioeconomic characteristics of the study participants. The instrument also collected data on risk factors of smoking, types of smoking methods used and smoking behaviour. A series of quality assurance processes were implemented to ensure data quality was not compromised but preserved, including data validation, data cleaning and questionnaire verification, as well as ensuring that questionnaires were tested for consistency. Daily administered questionnaires were checked by the principal investigator to ensure quality assurance of collected data and completeness of questionnaires.

Ethical considerations

Ethical approval to conduct this study was obtained from the Research Ethics Committee of the University of Namibia (ref. no. OSHAC586/2020) and from the Namibian Ministry of Health and Social Services (ref. no. 17/3/3 SM).

Data analysis

Data were coded, entered into an Excel (Microsoft, USA) spreadsheet and exported to Stata version 15 (StataCorp, USA), where data cleaning and analysis were done. The dependent variable was the smoking status of the individual, a dichotomous variable. Smoking status as well as other sociodemographic characteristics were summarised using descriptive statistics. In estimating the influence of sociodemographic characteristics on smoking, data analysis was stratified by individual, i.e. as HCW or non-HCW. Pearson χ^2 tests were used to determine the association between sociodemographic characteristics and smoking status. Statistically significant variables in the bivariate analysis were used as predictors in the univariate model. Variables that were significant and those whose p-value was <0.15 were used as predictor variables in the multivariate logistic regression.[16] The results were expressed as odds ratios (ORs) with 95% confidence intervals (CIs) and a statistical significance level of $p<0.05$.

Results

Sample description

Overall, 461 respondents were enrolled in the study, but only 434 responded to the questionnaires, giving a response rate of 95%. The sample comprised of 177 (40.9%) males and 257 (59.1%) females. The mean age of participants involved in the study was 32.5 (standard deviation 11.34) years, and their ages ranged between 17 and 60 years. The majority (60.9%, n=265) of the respondents were aged between 17 and 34 years. In addition, the majority of respondents (25%, n=108) were from Sibbinda constituency. Furthermore, the sample comprised 93 (21.5%) respondents who

were HCWs. The sociodemographic characteristics of the study participants are summarised in Table 1.

Prevalence and factors associated with smoking

Of the 434 respondents who participated in the study, 129 (29.1%) were smokers, of whom 14.2% (*n*=18) were HCWs, while 85.8% (*n*=108) were non-HCWs. Our data further suggested that the prevalence of smoking was highest among those aged between 26 and 34 years (36%, 95% CI 27.1 - 45.7), and lowest among those aged between 35 and 43 years (21.8%, 95% CI 13.6 - 32). The prevalence of smoking was significantly associated ($p<0.05$) with: area of residency (constituency); gender; age category; level of education; age of onset of smoking; and daily smoking prevalence.

When controlled for being a HCW or non-HCW, area of residency (constituency) was associated with smoking among non-HCWs ($\chi^2=16.3$, $p=0.022$) but not among HCWs ($\chi^2=3.4$, $p=0.841$). Furthermore, gender and age were also associated with smoking among non-HCWs. On the other hand, marital status ($\chi^2=12.6$, $p=0.013$) and daily smoking frequency ($\chi^2=13.6$, p=0.001) were associated with smoking among HCWs (Table 2).

Table 1. Sociodemographic characteristics of study participants

Variable	Characteristic	*n* (%)
Gender		
	Male	177 (48.9)
	Female	257 (59.1)
Age, years		
	17 - 25	157 (36.0)
	26 - 34	108 (24.9)
	35 - 43	87 (20.1)
	44 - 52	54 (12.5)
	53 - 60	28 (6.5)
Marital status		
	Single	234 (54.0)
	Married	130 (30.0)
	Separated	44 (10.0)
	Divorced	16 (3.7)
	Widowed	10 (2.3)
Education level		
	Primary	34 (7.9)
	Secondary	109 (25.2)
	Post-secondary	131 (30.3)
	First-stage tertiary	100 (23.2)
	Second-stage tertiary	58 (13.4)
Area (constituency)		
	Kabbe	43 (9.93)
	Kabbe North	44 (10.16)
	Linyanti	48 (11.09)
	Judea Lyamboloma	51 (11.78)
	Sibbinda	108 (24.94)
	Katima Mulilo urban	63 (14.55)
	Katima Mulilo rural	42 (9.7)
	Kongola	35 (7.85)

In the univariate logistic analysis, gender (OR 0.389, 95% CI 0.255 - 0.595) and daily smoking frequency (OR 0.037, 95% CI 0.003 - 0.439) were significantly associated with smoking. On the other hand, factors such as area, age category and level of education were not associated with smoking, despite having been included in the final model. In the final multivariate model and after controlling for the covariate (HCWs and non-HCWs), the odds of smoking among females who were non-HCWs were lower (OR 0.387, 95% CI 0.228 - 0.655) than males in the same category. On the other hand, there were no significance differences in the odds of smoking among males and females who were HCWs (Table 3). The study further showed that the odds of smoking among non-HCWs who had only attained primary school were higher than among those who had secondary education (OR 0.17, 95% CI 0.065 - 0.483), post-secondary education (OR 0.116, 95% CI 0.041 - 0.330) and first-level tertiary education (OR 0.306, 95% CI 0.101 - 0.881). Furthermore, the odds of smoking among those who had obtained first-level tertiary education (OR 0.306, 95% CI 0.101 - 0.881) were also higher than among those who had obtained secondary education (OR 0.17, 95% CI 0.065 - 0.483) and post-secondary education (OR 0.116, 95% CI 0.041 - 0.330). No significant differences in the odds of smoking were observed between non-HCWs who had primary education and those with second-stage tertiary education. On the other hand, no statistical differences were observed in the odds of smoking among the various education levels for HCWs. However, the odds of smoking for HCWs aged between 53 and 60 years were higher (OR 20.16, 95% CI 1.047 - 33.18) than the other age groups (Table 3).

Discussion

In recent years, various surveys have been conducted regarding smoking in Namibia.[11,12,17,18] However, there is a paucity of information on the prevalence of smoking and associated factors in Zambezi region. Knowledge of the prevalence and associated factors of smoking would be essential in the design and implementation of smoking cessation strategies. The present study contributes to knowledge gaps on the prevalence and risk factors in Namibia by focusing on the rural region of Zambezi.

In this study, the overall prevalence of smoking was 29.1%. The study further showed that the majority of smokers (85.8%, *n*=108) were non-HCWs. The prevalence of smoking observed is comparable to the findings that were reported in 2016 among the adult population (aged ≥15 years) in Namibia.[10,19] The prevalence of smoking observed in the current study is higher than what has been reported in Botswana,[20] Zambia,[21] Ghana[22] and South Africa.[23] Our results suggest that despite the implementation of anti-tobacco measures, the prevalence of smoking in Namibia remains high. While other countries have designed strategies to adopt and implement the WHO's Framework Convention on Tobacco Control, Namibia has a shorter history of implementing tobacco control measures owing to battles with the tobacco industry.[24,25] Our results also show that area of residence (rural or urban) had a varied effect on the prevalence of smoking. Notably, our study findings contrast with the findings made by Völzke [25] in Germany. Our study showed that the prevalence of smoking was lower in Katima urban area. This may be be due to

Table 2. Bivariate analysis of smoking status across selected risk factors (*N*=435)

Variable	Characteristic	Smoker, *n* (%)* Yes	No	*p*-value
Gender				
	Male	72 (16.6)	105 (24.2)	0.001
	Female	54 (12.5)	202 (46.7)	
Age				
	17 - 25 years	47 (10.9)	109 (25.0)	0.042
	26 - 34 years	39 (9.0)	69 (16.0)	
	35 - 43 years	19 (4.0)	68 (16.0)	
	44 - 52 years	18 (4.0)	36 (8.0)	
	53 - 60 years	3 (0.7)	25 (6.0)	
Marital status				
	Single	76 (17.0)	158 (36.0)	0.335
	Married	32 (7.0)	98 (22.0)	
	Separated	9 (2.0)	43 (10.0)	
	Divorced	5 (1.0)	11 (2.00)	
	Widowed	4 (0.9)	6 (1.0)	
Education level				
	Primary	19 (4.3)	15 (3.4)	0.001
	Secondary	29 (6.7)	80 (18.5)	
	Post-secondary	24 (5.5)	107 (24)	
	First-stage tertiary	31 (7.1)	69 (15)	
	Second-stage tertiary	23 (5.3)	35 (8.1)	
Area				
	Kabbe South	18 (4.1)	25 (5.7)	0.02
	Kabbe North	15 (3.4)	29 (6.6)	
	Linyanti	17 (3.9)	31 (7.1)	
	Judea Lyamboloma	16 (3.6)	35 (8.0)	
	Sibbinda	18 (4.1)	90 (20.)	
	Katima Mulilo Urban	15 (3.4)	48 (11.0)	
	Rural Katima Mulilo	17 (3.9)	25 (5.7)	
	Kongola	10 (2.3)	24 (5.5)	
Parents smoked				
	None	37 (28.6)	1 (0.7)	0.513
	One	50 (38.7)	3 (2.3)	
	Both	28 (21.7)	9 (0)	
	I don't know	8 (6.2)	0 (0)	
Age of onset of smoking				
	17 - 25 years	120 (93.0)	3 (2.3)	0.036
	26 - 34 years	3 (2.3)	1 (0.7)	
	35 - 43 years	2 (1.5)	0 (0)	

higher exposure of the urban population to electronic media and tobacco advertisements.[26,27]

Our study showed that most smokers had started smoking when aged between 17 and 25 years. This is concordant with previous observations by Amakali *et al.*[11] and Lande.[29] These authors concluded that there were more smokers in the younger age range between 15 and 25 years than in any other age group. Our study suggested that the odds of smoking were higher for older than younger age groups. The reduction in the odds of smoking in the younger generation compared with elderly people may be due to higher academic achievements, religious/traditional groupings and racial/ethnic pride.[30] On the other hand, social and physical environmental factors,[31-33] mental health factors,[31] lower socioeconomic status[31,34] and individual personal views[35] have been found to enhance the odds of smoking, usually associated with elderly people.[35] This is further corroborated by the outcome of the National Drug Strategy Household Survey[35] of 2019 in Australia, which showed that rates of smoking were decreasing among the younger generation.

Although our study showed that gender had no significant influence on the risks of smoking, we observed that there were more male smokers than female smokers. These findings

Table 3. Bivariate analysis of smoking status across selected risk factors for HCWs and non-HCWs

		HCW smokers, *n* (%)*			Non-HCW smokers, *n* (%)*		
Variable	**Characteristic**	**Yes**	**No**	***p*-value**	**Yes**	**No**	***p*-value**
Gender							
	Male	10 (10.7)	25 (26.8)	0.081	62 (17.7)	80 (22.8)	0.001
	Female	8 (8.6)	50 (8.6)		46 (13)	162 (46.2)	
Age							
	17 - 25 years	4 (4.3)	17 (18.2)	0.62	43 (12.6)	92 (27)	0.002
	26 - 34 years	5 (5.3)	22 (23.6)		34 (10)	47 (13.8)	
	35 - 43 years	5 (5.3)	20 (21.5)		14 (4.1)	48 (14.1)	
	44 - 52 years	1 (1)	11 (11)		17 (5)	25 (7.3)	
	53 - 60 years	3 (3.25)	5 (5.3)		0 (0)	20 (5.8)	
Marital status							
	Single	10 (10.7)	34 (36.5)	0.013	66(19.4)	124 (36.4)	0.687
	Married	3 (3.2)	30 (32.2)		29 (8.5)	68 (20)	
	Separated	1 (1)	8 (8.6)		8 (2.3)	26 (7.6)	
	Divorced	2 (2.1)	3 (2.1)		3 (0.8)	8 (2.3)	
	Widowed	2 (2.1)	0 (0)		2 (0.5)	6 (1.7)	
Educational level							
	Primary	1 (1)	7 (7.5)	0.343	18 (5.3)	8 (2.3)	0.001
	Secondary	5 (55.3)	7 (7.5)		24 (7.0)	73 (21.5)	
	Post-secondary	4 (4.3)	22 (23.6)		20 (5.8)	85 (25)	
	First-stage tertiary	5 (5.3)	24 (25.8)		26 (7.6)	45 (13.2)	
	Second-stage tertiary	3 (3.2)	15 (16.1)		20 (5.8)	20 (5.8)	
Area							
	Kabbe South	3 (3.2)	5 (5.3)	0.841	15 (4.4)	20 (5.8)	0.022
	Kabbe North	3 (3.2)	8 (8.6)		12 (3.5)	21 (6.1)	
	Linyanti	3 (3.2)	11 (11.8)		14 (4.11)	20 (5.8)	
	Judea Lyamboloma	3 (3.2)	12 (12.9)		13 (3.8)	23 (6.7)	
	Sibbinda	2 (2.1)	14 (15)		16 (4.7)	76 (22.3)	
	Katima Mulilo Urban	1 (1)	9 (9.6)		14 (4.11)	39 (11.4)	
	Rural Katima Mulilo	1 (1)	4 (4.3)		16 (4.7)	21 (6.1)	
	Kongola	2 (2.1)	12 (12.9)		8 (2.3)	12 (3.5)	
Age of onset of smoking							
	17 - 25 years	16 (76.1)	2 (9.5)	0.301	104 (96.2)	1 (0.9)	0.986
	26 - 34 years	1 (4.7)	1 (4.7)		2 (1.8)	0 (0)	
	35 - 43 years	1 (4.7)	0 (0)		1 (0.9)	0 (0)	

HCW = healthcare worker.
*Number of responses varied.

corroborate the findings of Amakali *et al.*,[11] Sieminska and Jassem,[36] Higgins *et al.*,[37] Chinwong *et al.*[38] and Allen *et al.*[40] Earlier studies focusing on gender and smoking concluded that the difference observed in our study as well as others in the prevalence of smoking between males and females may be be due to cultural, religious, psychological, behavioural and physiological factors.[36,40,41] Research has shown that smoking behaviour varies between males and females: for example, females usually smoke for a shorter period of time and normally take smaller puffs compared with males.[43] Similarly, the perception of smoking function between males and females varies. Males are more likely to enjoy smoking and use this as a motive to continue smoking, while the motives for females are weight control and stress relief.[43,44] The present study also observed that levels of education may have an influence on the odds of smoking. Studies[42,45-47] have suggested that education may be an indicator of socioeconomic status, as it may affect employment and income, and knowledge levels, which play a major role in making health behaviour choices. The findings observed in the present study corroborate those observed by Cao *et al.*[48] and Chen *et al.*[49] These authors concluded that the odds of smoking were higher for people living below the poverty level, and those with lower levels of educational achievement. Our study further observed that the odds of smoking were also high for those who had attained first-level tertiary education. This outcome may be due to peer pressure. Studies conducted in Kenya[50] and Iran[51] concluded that peer pressure among university students increased the odds of smoking.[52]

Conclusion

The present study is unique in that it delivers the first quantitative report on the prevalence and risk factors of smoking among HCWs and non-HCWs in Zambezi region. According to the results of this

Table 4. Multivariate analysis of smoking across selected risk factors

		Non-HCW			HCW		
Variable	**Characteristic**	**OR**	***p*-value**	**95% CI**	**OR**	***p*-value**	**95% CI**
Gender							
	Male	Ref.					
	Female	0.386	0.001	0.228 - 0.655	0.302	0.084	0.078 - 1.172
Age category							
	17 - 25 years	Ref.					
	26 - 34 years	1.691	0.123	0.867 - 3.298	2.233	0.365	0.393 - 12.686
	35 - 43 years	0.555	0.168	0.240 - 1.280	4.303	0.142	0.614 - 30.137
	44 - 52 years	1.520	0.392	0.583 - 3.959	1		
	53 - 60 years	1.000			20.16	0.046	1.047 - 33.18
Marital status							
	Single	Ref.					
	Married	1.084	0.819	0.545 - 2.154	0.163	0.07	0.023 - 1.157
	Widowed	1.308	0.649	0.412 - 4.415	0.089	0.108	0.005 - 1.699
	Divorced	0.534	0.435	0.110 - 2.582	3.182	0.319	0.327 - 30.94
	Separated	0.492	0.43	0.084 - 2.859	1		
Education							
	Primary	Ref.					
	Secondary	0.178	0.001	0.0659 - 0.483	2.823	1.04	0.401 - 19.85
	Post-secondary	0.117	0.001	0.0412 - 0.330	0.727	–0.32	0.102 - 5.156
	First-stage tertiary	0.306	0.028	0.106 - 0.881	1.216	0.21	0.190 - 7.771
	Second-stage tertiary	0.567	0.327	0.812 - 1.763	1		

OR = odds ratio; CI = confidence interval; HCW = healthcare worker; Ref. = reference.

study, smoking prevalence among non-HCWs and HCWs working in Zambezi was similar to that of the general Namibian population. However, the prevalence of smoking observed in the current study is higher than what has been reported in neighbouring African countries. There is a need to develop tobacco use preventive interventions and strategies that target HCWs and non-HCWs that are tailored to the local context and sensitive to the culture and community norms in Zambezi region, Namibia. Lastly, comprehensive tobacco control policies aimed at reducing smoking among HCWs are needed.

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